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Ch. 15 – Allocation of Support Department Costs, Common Costs, and Revenue

1. The Central Valley Company has prepared department overhead budgets for normal-volume levels before allocations, as follows:

Support departments:		
Building and grounds	\$10,000	
Personnel	1,000	
General factory administration	26,090	
Cafeteria – operating loss	1,640	
Storeroom	2,670	
Total		\$ 41,400
Operating departments:		
Machining	\$34,700	
Assembly	48,900	
Total		83,600
Total for both departments		\$125,000

Management has decided that the most appropriate inventory costs are achieved by using individual department overhead rates. These rates are developed after support department costs are allocated to operating departments.

Bases for allocation are to be selected from the following:

Department	Direct Manufacturing Labor-Hours	Number of Employees	Sq. Ft. of Floor Space Occupied	(Direct + Indirect) Manufacturing Labor-Hours	Total Number of Requisitions
Building and grounds	0	0	0	0	0
Personnel*	0	0	2,000	0	0
General factory administration	0	35	7,000	0	0
Cafeteria	0	10	4,000	1,000	0
Storeroom	0	5	7,000	1,000	0
Machining	5,000 <i>5/20</i>	50 <i>1/3</i>	30,000 <i>3/8</i>	8,000 <i>8/25</i>	2,000 <i>2/3</i>
Assembly	15,000 <i>15/20</i>	100 <i>2/3</i>	50,000 <i>5/8</i>	17,000 <i>17/25</i>	1,000 <i>1/3</i>
Total	20,000	200	100,000	27,000	3,000

*Basis used is number of employees.

Required:

1. Using a worksheet, allocate support department costs by the step-down method. Develop overhead rates per direct manufacturing labor-hour for machining and assembly. Allocate the support departments in the order given in this problem. Use the allocation base for each support department you think is most appropriate.
2. Using the direct method, rework requirement 1.
3. Based on the following information about two jobs, determine the total overhead costs for each job by using rates developed (a) in requirement 1 and (b) requirement 2.

	Direct Manufacturing Labor Hours	
	Machining	Assembly
Job 88	18	2
Job 89	3	17

15-31 Allocating costs of support departments; step-down and direct methods.

	sqft	# of employees	labor hrs	# of employees	# of requisition		
	Building & Grounds	Personnel	General Plant Admin.	Cafeteria Operating Loss	Storeroom	Machining	Assembly
1. Step-down Method:	\$10,000	\$1,000	\$26,090	\$1,640	\$2,670	\$34,700	\$48,900
(1) Building & grounds $\$10,000 \div 100,000 = \$0.10/\text{sqft.}$	10,000	200	700	400	700	3,000	5,000
(2) Personnel $\$1,200 \div 200 = \$6/\text{employee}$		1,200 (1,000 + 200)	35 210	10 60	5 30	50 3,000	100 600
(3) General plant administration $\$27,000 \div 27,000 = \$1/\text{labor hour}$			27,000 (26,090 + 210 + 700)	1,000	1,000	8,000	17,000
(4) Cafeteria $\$3,100 \div 155 = \$20/\text{employee}$				3,100	100	50 1,000	100 2,000
(5) Storeroom $\$4,500 \div 3,000 = \$1.50/\text{requisition}$					4,500	2,000 3,000	1,000 1,500
(6) Costs allocated to operating depts.						5,000 +	75,000 =
(7) Divide (6) by Direct manf. labor hrs.						$\div 5,000$	$\div 15,000$
(8) OH rate per Direct manf. labor hr.						\$ 10/DLH	\$ 5/DLH

5 storeroom
50 machining
100 assembly
155

125,000

	Building & Grounds	Personnel	General Plant Admin.	Cafeteria Operating Loss	Storeroom	Machining	Assembly
2. Direct method:	\$10,000	\$1,000	\$26,090	\$1,640	\$2,670	\$34,700	\$48,900
(1) Building & grounds $\frac{30,000}{80,000 \text{ sqft.}}$; $\frac{50,000}{89,000 \text{ sqft.}}$	(10,000)					$\frac{3}{8}$ 3750	$\frac{5}{8}$ 6250
(2) Personnel $\frac{50}{150}$; $\frac{100}{150}$ employees		(1000)				$\frac{1}{3}$ 333	$\frac{2}{3}$ 667
(3) General plant administration, $\frac{8000}{25,000}$; $\frac{17,000}{25,000}$ total LHS			(26,090)			$\frac{8}{25}$ 8349	$\frac{17}{25}$ 17,741
(4) Cafeteria $\frac{50}{150}$; $\frac{150}{150}$ employees				(1640)		$\frac{1}{3}$ 547	$\frac{2}{3}$ 1093
(5) Storeroom $\frac{2000}{3000}$; $\frac{1000}{3000}$ requisitions					(2670)	$\frac{2}{3}$ 1780	$\frac{1}{3}$ 890
(6) Costs allocated to operating depts.						\$ 49,459 +	\$ 75,541 = <u>125,000</u>
Divide (6) by direct mfg LHS					DLH	<u>÷ 5000</u>	<u>÷ 15,000</u>
						<u>\$ 9.892 per DLH</u>	<u>\$ 5.036 per DLH</u>

3.

Comparison of Methods:

		<u>DLT</u>		
Step-down method:	Job 88:	M 18 x \$10 = \$180		\$190.00
		A 2 x \$5 = 10		
	Job 89:	M 3 x \$10 = \$30		115.00
		A 17 x \$5 = 85		
Direct method:	Job 88:	M 18 x \$9.892 = \$178.06		Less \$188.13
		A 2 x \$5.036 = 10.07		
	Job 89:	M 3 x \$9.892 = \$29.68		\$115.29 ^{more}
		A 17 x \$5.036 = 85.61		

4. Mach. Dept mgr. → prefers Direct Method (lower alloc. of support dept costs)
vice versa for Assembly Dept. mgr.

EXERCISES AND PROBLEMS

2.
Differently
2

The fixed costs of operating the maintenance facility of General Hospital are \$4,500,000 annually. Variable costs are incurred at the rate of \$30 per maintenance-hour. The facility averages 40,000 maintenance-hours a year. Budgeted and actual hours per user for 20x3 are as follows:

	<u>Budgeted hours</u>	<u>Actual hours</u>
Building and grounds	10,000 (1/4)	12,000
Operating and emergency	8,000 (1/5)	8,000
Patient care	21,000 (21/40)	22,000
Administration	1,000 (1/40)	1,200
Total	<u>40,000</u>	<u>43,200</u>

VC = 30
FC =
40,000
1,200,000
4,500,000
5,700,000
÷ 40,000
\$142.50 per maint. hour
\$30 VC
\$112.50 FC

Assume that budgeted maintenance-hours are used to calculate the allocation rates.

Required:

- If a single-rate cost-allocation method is used, what amount of maintenance cost will be budgeted for each department?
- If a single-rate cost-allocation method is used, what amount of maintenance cost will be allocated to each department based on actual usage? Based on budgeted usage?
- If a dual-rate cost-allocation method is used, what amount of maintenance cost will be budgeted for each department?
- If a dual-rate cost-allocation method is used, what amount of maintenance cost will be allocated to each department based on actual usage? Based on budgeted usage for fixed operating costs and actual usage for variable operating costs?

Same answer as part a.

Answer:

a. Total costs = $\overset{FC}{\$4,500,000} + (\overset{VC}{\$30} \times 40,000) = \$5,700,000$
 Single rate = $\$5,700,000 / 40,000 \text{ mh} = \142.50 per maintenance-hour

Single-rate budgeted amounts:

Building and grounds	$\$142.50 \times 10,000$	= \$1,425,000
Operating and emergency	$\$142.50 \times 8,000$	= \$1,140,000
Patient care	$\$142.50 \times 21,000$	= \$2,992,500
Administration	$\$142.50 \times 1,000$	= \$ 142,500

5,700,000 Budgeted

b. Total costs = $\$4,500,000 + (\$30 \times 40,000) = \$5,700,000$
 Single rate = $\$5,700,000 / 40,000 \text{ mh} = \142.50 per maintenance-hour

Single-rate allocated amounts:

Building and grounds	$\$142.50 \times 12,000$	= \$1,710,000
Operating and emergency	$\$142.50 \times 8,000$	= \$1,140,000
Patient care	$\$142.50 \times 22,000$	= \$3,135,000
Administration	$\$142.50 \times 1,200$	= \$ 171,000

6,156,000 Allocated.

c. Dual-rate budgeted amounts:

1/4 of total hours.

Building and grounds:	
Fixed ($\$4,500,000 \times 10/40$)	\$1,125,000
Variable ($\$30 \times 10,000$)	300,000
Total	<u>\$1,425,000</u>
Operating and emergency:	
Fixed ($\$4,500,000 \times 8/40$)	\$ 900,000
Variable ($\$30 \times 8,000$)	240,000
Total	<u>\$1,140,000</u>
Patient care:	
Fixed ($\$4,500,000 \times 21/40$)	\$2,362,500
Variable ($\$30 \times 21,000$)	630,000
Total	<u>\$2,992,500</u>
Administration:	
Fixed ($\$4,500,000 \times 1/40$)	\$112,500
Variable ($\$30 \times 1,000$)	30,000
Total	<u>\$142,500</u>

5,700,000
Budgeted.

d. Dual-rate allocated amounts:

Building and grounds:	
Fixed ($\$4,500,000 \times 10/40$)	\$1,125,000
Variable ($\$30 \times 12,000$)	360,000
Total	<u>\$1,485,000</u>
Operating and emergency:	
Fixed ($\$4,500,000 \times 8/40$)	\$ 900,000
Variable ($\$30 \times 8,000$)	240,000
Total	<u>\$1,140,000</u>
Patient care:	
Fixed ($\$4,500,000 \times 21/40$)	\$2,362,500
Variable ($\$30 \times 22,000$)	660,000
Total	<u>\$3,022,500</u>
Administration:	
Fixed ($\$4,500,000 \times 1/40$)	\$112,500
Variable ($\$30 \times 1,200$)	36,000
Total	<u>\$148,500</u>

5,796,000
Allocated.
based on
actual usage.

Difficulty: 2

Objective: 1

3. Blaster Drive-In is a fast-food restaurant that sells burgers and hot dogs in a 1950s environment. The fixed operating costs of the company are \$5,000 per month. The controlling shareholder, interested in product profitability and pricing, wants all costs allocated to either the burgers or the hot dogs. The following information is provided for the operations of the company:

	<u>Burgers</u>		<u>Hot Dogs</u>	
Sales for January	4,000	+	2,400	= 6,400
Sales for February	6,400	+	2,400	= 8,800

Required:

- What amount of fixed operating costs is assigned to the burgers and hot dogs when actual sales are used as the allocation base for January? For February?
- Hot dog sales for January and February remained constant. Did the amount of fixed operating costs allocated to hot dogs also remain constant for January and February? Explain why or why not. Comment on any other observations.

Answer:

- a. *January sales:*

		<u>Units</u>	<u>Per Unit</u>
Burgers	$\$5,000 \times 4,000/6,400 = \$3,125$	$\div 4,000$	$= 0.78125$
Hot dogs	$\$5,000 \times 2,400/6,400 = \$1,875$	$\div 2,400$	$= 0.78125$
	<u>\$5,000</u>		

- February sales:*

Burgers	$\$5,000 \times 6,400/8,800 = \$3,636.36$	$\div 6,400$	$= 0.5681812$
Hot dogs	$\$5,000 \times 2,400/8,800 = \$1,363.64$	$\div 2,400$	$= 0.568183$
	<u>\$5,000</u>		

- b. Even though hot dog sales remained constant for both months, the allocation of fixed operating costs decreased by more than \$500. The reason is that fixed overhead costs are allocated based on actual sales. The dollar amount is fixed, and since burger sales increased, more of the fixed costs were allocated to the burgers.

Another observation is that burger sales increased by more than 50% from January to February, while the fixed operating costs assigned to burgers increased by only 16%.

4. Gotham University offers only high-tech graduate-level programs. Gotham has two principal operating departments, Engineering and Computer Sciences, and two support departments, Facility and Technology Maintenance and Enrollment Services. The base used to allocate facility and technology maintenance is budgeted total maintenance hours. The base used to allocate enrollment services is number of credit hours for a department. The Facility and Technology Maintenance budget is \$350,000, while the Enrollment Services budget is \$950,000. The following chart summarizes budgeted amounts and allocation-base amounts used by each department.

	Budget	Services Provided: (Annually)			
		Engineering	Computer Sciences	F&T Maintenance	Enrollment Service
F&T Maintenance (in hours)	\$350,000	2,000 <i>hours</i>	5,000	Zero	1,000
Enrollment Service (in credit hrs)	\$950,000	24,000	36,000	2,000	Zero

Budgeted Total Maint. hours.
of credit hours

operating departments

Required:

Use the direct method to allocate support costs to each of the two principal operating departments, Engineering and Computer Sciences. Prepare a schedule showing the support costs allocated to each department.

Answer:

		Engineering	Computer Science
F&T Maintenance	\$350,000 x 2/7 =	\$100,000	
	\$350,000 x 5/7 =		\$250,000
Enrollment Service	\$950,000 x 24/60 =	\$380,000	
	\$950,000 x 36/60 =		\$570,000
Total		\$480,000	\$820,000

5. Gotham University offers only high-tech graduate-level programs. Gotham has two principal operating departments, Engineering and Computer Sciences, and two support departments, Facility and Technology Maintenance and Enrollment Services. The base used to allocate facility and technology maintenance is budgeted total maintenance hours. The base used to allocate enrollment services is number of credit hours for a department. The Facility and Technology Maintenance budget is \$350,000, while the Enrollment Services budget is \$950,000. The following chart summarizes budgeted amounts and allocation-base amounts used by each department.

	Budget	Services Provided: (Annually)				Total
		Engineering	Computer Sciences	F&T Maintenance	Enrollment Service	
F&T Maintenance (in hours)	\$350,000	1,000	2,000	Zero <i>provided to itself</i>	5,000	= 8,000 hrs
Enrollment Service (in credit hrs)	\$950,000	24,000	36,000	2,000	Zero <i>provided to itself</i>	= 62,000 hrs.

Required:

Prepare a schedule, which allocates service department costs using the step-down method with the sequence of allocation based on the highest-percentage support concept. Compute the total amount of support costs allocated to each of the two principal operating departments, Engineering and Computer Sciences.

Answer:

F&T Maintenance provided to enrollment services = $5,000/8,000$ since $5/8 > 2/62$

Enrollment services provided to maintenance = $2,000/62,000$

F&T Maintenance provides the greatest amount of service to support departments, so it is allocated first.

F&T Maintenance \$350,000 to Enrollment Services = $\$350,000 \times 5/8 = \$218,750$

to Engineering = $\$350,000 \times 1/8 = \$43,750$

to Computer Science = $\$350,000 \times 2/8 = \$87,500$

Enrollment Service costs of \$950,000 + $\$218,750 = \$1,168,750$

are allocated to Engineering and Computer Science

to Engineering = $\$1,168,750 \times 24/60 = \$467,500$

to Computer Science = $\$1,168,750 \times 36/60 = \$701,250$

F&T Maintenance	Enrollment Service	Engineering	Computer Science
\$350,000	\$950,000		
<u>(\$350,000)</u>	218,750	\$43,750	\$87,500
<u>\$ 0</u>	<u>(\$1,168,750)</u>	<u>\$467,500</u>	<u>\$701,250</u>
Totals	<u>\$ 0</u>	<u>\$511,250</u>	<u>\$788,750</u>

1,300,000

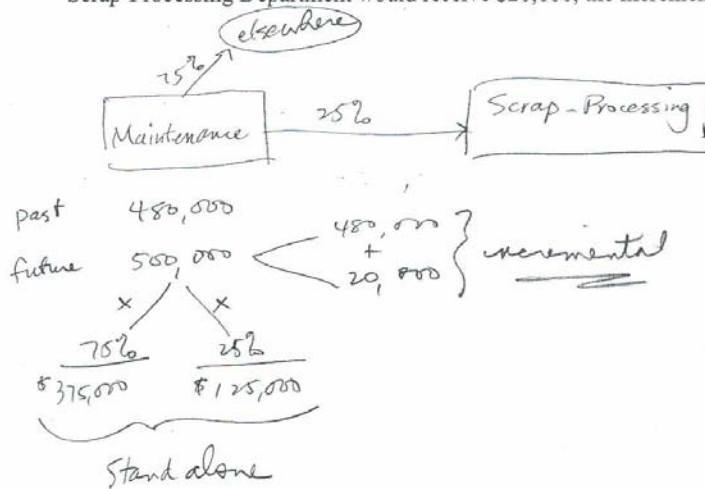
7. The Maintenance Department has been servicing Gizmo Production for four years. Beginning next year, the company is adding a Scrap-Processing Department to recycle the materials from Gizmo Production. As a result, maintenance costs are expected to increase from \$480,000 per year to \$500,000 per year. The Scrap-Processing Department will utilize 25% of the maintenance efforts.

Required:

- Using the stand-alone cost-allocation method, identify the amount of maintenance cost that will be allocated to Gizmo Production and the Scrap-Processing Department next year.
- Using the incremental cost-allocation method, identify the amount of maintenance cost that will be allocated to Gizmo Production and the Scrap-Processing Department next year.

Answer:

- Gizmo Production = $\$500,000 \times 0.75 = \$375,000$
Scrap-Processing Department = $\$500,000 \times 0.25 = \$125,000$
- Gizmo Production would receive \$480,000.
Scrap-Processing Department would receive \$20,000, the incremental amount



Methods to Allocate Revenue to Bundled Products

- Stand-Alone (separate) Revenue Allocation Method uses product-specific information on the products in the bundle as weights for allocating the bundled revenues to the individual products. Three types of weights may be used:
 1. Selling Prices ✓
 2. Unit Costs ✓
 3. Physical Units ✓ (straight average.)

8. Software For You encounters revenue-allocation decisions with its bundled product sales. Here, two or more units of the software are sold as a single package. Managers at Software For You are keenly interested in individual product-profitability figures. Information pertaining to its three bundled products and the stand-alone selling prices of its individual products is as follows:

	Stand-Alone Selling Price	[Unit Cost]	Package	Packaged Price
Word Processing (WP)	\$125	\$18	WP & SS	\$220
Spreadsheet (SS)	\$150	\$20	WP & AS	\$280
Accounting Software (AS)	\$225	\$25	All three	\$380

Required:

- a. Using the stand-alone revenue-allocation method, allocate the \$380 packaged price of "All Three" to the three software products
- with selling prices as the weights.
 - with individual product costs as the weights.
 - based on physical units.
- b. Allocate the \$380 packaged price of "All Three" to the three software products using the incremental revenue-allocation method. Assume Word Processing is the primary product, followed by Spreadsheet, and then Accounting Software.

Answer:

a1. $WP \$125 + SS \$150 + AS \$225 = \500

using selling price as weights

WP	$(\$125 / \$500) \times \$380$	= \$ 95
SS	$(\$150 / \$500) \times \$380$	= \$114
AS	$(\$225 / \$500) \times \$380$	= \$171
Total		<u>\$380</u>

a2. $WP \$18 + SS \$20 + AS \$25 = \63

using individual product costs as weights

WP	$(\$18 / \$63) \times \$380$	= \$108.57
SS	$(\$20 / \$63) \times \$380$	= \$120.64
AS	$(\$25 / \$63) \times \$380$	= \$150.79
Total		<u>\$380.00</u>

using physical units as weights

a3. $1 / (1 + 1 + 1) \times \$380 = \126.67 per software package

Straight averaging

Methods to Allocate Revenue to Bundled Products

- Incremental Revenue-Allocation Method ranks individual products in a bundle according to criteria determined by management and then uses this ranking to allocate bundled revenues to individual products (similar to earlier discussed Incremental Cost-Allocation Method)
 - The first-ranked product is the primary product
 - The second-ranked product is the first incremental product
 - The third-ranked product is the second incremental product, etc

b.

Product	Revenue Allocated	Revenue Remaining To Be Allocated
<i>WP</i>	\$125 ✓	$\$380 - 125 = \255
<i>SS</i>	\$150 ✓	$\$380 - \$125 - \$150 = \105
<i>AS</i>	\$105 ✓	none
Total revenue allocated	<u>\$380</u>	